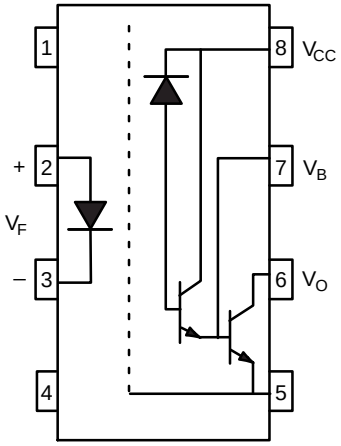

Figure 1. Schematics

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ABSOLUTE MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)

Symbol	Parameter	Device	Value	Unit
T_{STG}	Storage Temperature		−40 to +125	°C
T_{OPR}	Operating Temperature		−40 to +100	°C
T_J	Junction Temperature		−40 to +125	°C
T_{SOL}	Lead Solder Temperature		260 for 10 s	°C
EMITTER				
I_F (avg)	DC/Average Forward Input Current Per Channel	All	20	mA
I_F (pk)	Peak Forward Input Current Per Channel (50% Duty Cycle, 1 ms P.W.)	All	40	mA
I_F (trans)	Peak Transient Input Current Per Channel (≤1 μs P.W., 300 pps)	All	1	A
V_R	Reverse Input Voltage Per Channel	All	5	V
P_D	Input Power Dissipation Per Channel (Note 2)	All	35	mW
DETECTOR				
I_O (avg)	Average Output Current Per Channel	All	60	mA
V_{ER}	Emitter−Base Reverse Voltage	6N138M, 6N139M	0.5	V
V_{CC}, V_O	Supply Voltage, Output Voltage	6N138M, HCPL2730M	−0.5 to 7.0	V
		6N139M, HCPL2731M	−0.5 to 18.0	
P_O	Output Power Dissipation Per Channel	All	100	mW

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality

ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Device	Test Conditions	Min	Typ	Max	Unit
INDIVIDUAL COMPONENT CHARACTERISTICS (V_{CC} = 5.0 V, T_A = 0°C to 70°C unless otherwise specified. Typical value is measured at T_A = 25°C.)							
EMITTER							
V_F	Input Forward Voltage	All	I_F = 1.6 mA, T_A = 25°C	−	1.30	1.70	V
			I_F = 1.6 mA	−	−	1.75	
	Input Reverse Breakdown Voltage	All	I_R = 10 μA, T_A = 25°C	5.0	19.0	−	V
/	Temperature Coefficient of Forward Voltage	All	I_F = 1.6 mA	−	−1.94	−	mV/°C
CTOR							
	Logic Low Supply Current	6N138M, 6N139M	I_F = 1.6 mA, V_O = Open, V_{CCC} C =			1	0

ELECTRICAL CHARACTERISTICS (continued)

Symbol	Parameter	Device	Test Conditions	Min	Typ	Max	Unit

SWITCHING CHARACTERISTICS (V_{CC} = 5.0 V, T_A = 0°C to 70°C unless otherwise specified. Typical value is measured at T_A = 25°C.)

ELECTRICAL CHARACTERISTICS (continued)
(T_A = 25°C unless otherwise specified.)

Current Limiting Resistor Calculations:

$$R_1 \text{ (Non−Invert)} = \frac{V_{CC1} - V_{DF} - V_{OL1}}{I_F} \quad \text{(eq. 1)}$$

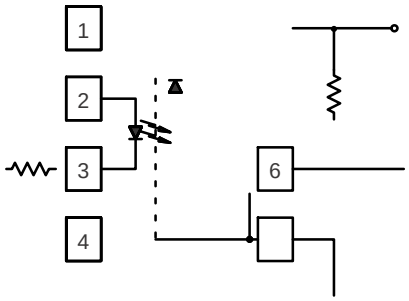
$$R_1 \text{ (Invert)} = \frac{V_{CC1} - V_{OH1} - V_{DF}}{I_F} \quad \text{(eq. 2)}$$

$$R_2 = \frac{V_{CC2} - V_{OLX} (@\ I_L - I_2)}{I_L} \quad \text{(eq. 3)}$$

Where:
V_{CC1} = Input Supply Voltage
V_{CC2} = Output Supply Voltage
V_{DF} = Diode Forward Voltage
V_{OL1} = Logic “0” Voltage of Driver
V_{OH1} = Logic “1” Voltage of Driver
I_F = Diode Forward Current
V_{OLX} = Saturation Voltage of Output Transistor
I_L = Load Current Through Resistor R_2
I_2 = Input Current of Output Gate

INPUT CONFIGURATION		R_1 (Ω)	R_2 (Ω) @ OUTPUT CONFIGURATION						
			CMOS @ 5 V	CMOS @ 10 V	74XX	74LXX	74SXX	74LSXX	74HXX
CMOS @ 5 V	NON−INV.	2000	1000	2200	750	1000	1000	1000	560
	INV.	510							
CMOS @ 10 V	NON−INV.	5100							
	INV.	4700							
74XX	NON−INV.	2200							
	INV.	180							
74LXX	NON−INV.	1800							
	INV.	100							
74SXX	NON−INV.	2000							
	INV.	360							
74LSXX	NON−INV.	2000							
	INV.	180							
74HXX	NON−INV.	2000							
	INV.	180							

Figure 2. Resistor Values for Logic Interface



Single−Channel: 6N138M, 6N139M Dual−

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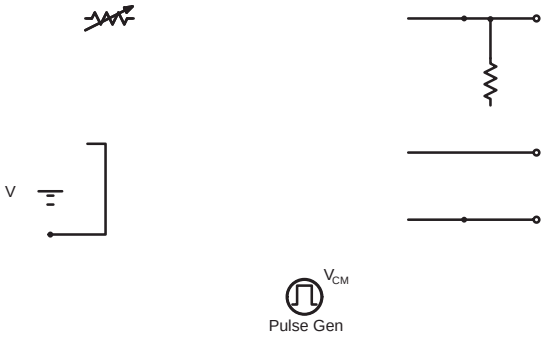
Test Circuits

Pulse
Generator
tr = 5 ns
Z_O = 50 Ω
10% Duty
Cycle
I_f < tr =100 μs



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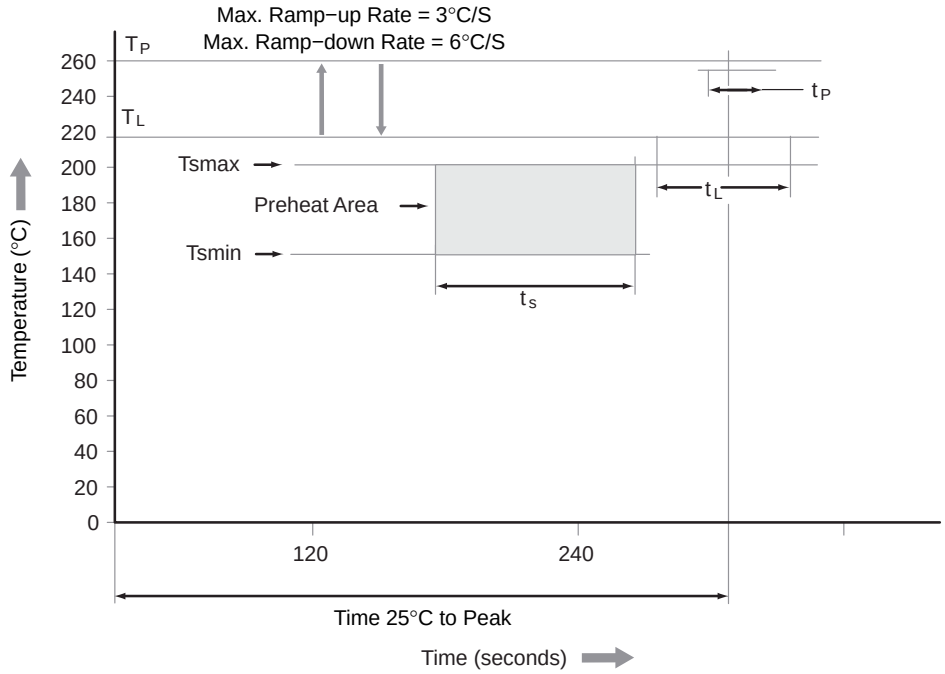

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ORDERING INFORMATION

Part Number	Package	Shipping†
6N138M	DIP 8−Pin (Pb−Free)	50 Units / Tube
6N138SM	SMT 8−Pin (Lead Bend) (Pb−Free)	50 Units / Tube
6N138SDM	SMT 8−Pin (Lead Bend) (Pb−Free)	1,000 Units / Tape & Reel
6N139M	DIP 8−Pin (Pb−Free)	50 Units / Tube
6N139SM	SMT 8−Pin (Lead Bend) (Pb−Free)	50 Units / Tube
6N139SDM	SMT 8−Pin (Lead Bend) (Pb−Free)	1,000 Units / Tape & Reel
6N139VM	DIP 8−Pin, DIN EN/IEC 60747−5−5 Option (Pb−Free)	50 Units / Tube
6N139SVM	SMT 8−Pin (Lead Bend), DIN EN/IEC 60747−5−5 Option (Pb−Free)	50 Units / Tube
6N139SDVM	SMT 8−Pin (Lead Bend), DIN EN/IEC 60747−5−5 Option (Pb−Free)	1,000 Units / Tape & Reel
6N139TVM	DIP 8−Pin, 0.4” Lead Spacing, DIN EN/IEC 60747−5−5 Option (Pb−Free)	50 Units / Tube
HCPL2730M	DIP 8−Pin (Pb−Free)	50 Units / Tube
HCPL2730SM	SMT 8−Pin (Lead Bend) (Pb−Free)	50 Units / Tube
HCPL2730SDM	SMT 8−Pin (Lead Bend) (Pb−Free)	1,000 Units / Tape & Reel
HCPL2731M	DIP 8−Pin (Pb−Free)	50 Units / Tube
HCPL2731SM	SMT 8−Pin (Lead Bend) (Pb−Free)	50 Units / Tube
HCPL2731SDM	SMT 8−Pin (Lead Bend) (Pb−Free)	1,000 Units / Tape & Reel
HCPL2731VM	DIP 8−Pin, DIN EN/IEC 60747−5−5 Option (Pb−Free)	50 Units / Tube

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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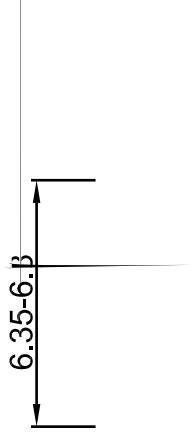
PDIP8 6.6x3.81, 2.54P



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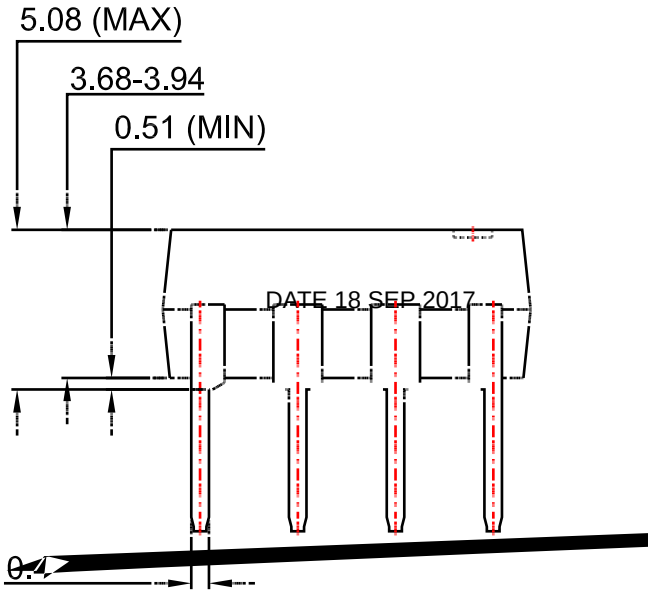
CASE 646CQ
ISSUE O



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